

productivity were assumed to be equivalent. Job satisfaction and quality of care were not factored into the model.

Results: The base cost of an attending physician alone is approximately \$68.15 per patient. The cost decreases when they are paired with 1 or 2 residents or 1 midlevel provider. When they are supervising 3 residents or 2 or more midlevel providers, the costs per patient increase (Table). The results are robust as long as attending physician productivity alone is less than 2.5 patients per hour at any physician salary range and, for midlevel provider productivities, up to 20% greater than that of residents. Resident productivity must increase by 30% to change the best model.

Conclusion: According to our model, the most cost-efficient staffing configurations in an academic ED are those pairing each attending physician with residents. Substituting midlevel providers for residents in any staffing configuration increased the overall cost per patient. The model allows for the outcomes to vary according to parameters specific to other institutions.

Table, abstract 56.

Cost efficiency results.

	Base Case Cost/pt, \$	MD Salary \$180,000, \$	MLP Productivity +20%, \$	Resident Productivity +30%, \$
MD alone	68.15	59.84	68.15	68.15
MD + 1 R	64.33	58.28	64.33	58.97
MD + 2 R	66.92	61.81	66.92	54.38
MD + 3 R	68.83	69.00	73.75	51.62
MD + 1 MLP	67.94	60.36	66.25	67.94
MD + 2 MLP	73.04	67.92	68.80	73.04
MD + 3 MLP	76.77	77.51	75.76	76.77
MD + 1 R + 1 MLP	69.98	64.87	67.89	64.98
MD + 2 R + 1 MLP	71.48	71.83	74.46	67.01
MD + 1 R + 2 MLPs	74.12	74.67	75.13	74.12

pt, Patient; MD, physician; MLP, midlevel provider; R, resident.

57 Health Care Provider Complaints to the Emergency Department: A Preliminary Report on a Novel Quality Improvement Instrument

Griffey RT, Bohan J/Brigham and Women's Hospital, Harvard University, Boston, MA

Study objectives: Patient complaints to the emergency department (ED) are an important component in assessing patient satisfaction and quality of care and have been studied from a number of perspectives. However, no study has addressed complaints made to the ED by health care providers (HCPs) (physicians, nurses, and hospital administrators). Given their training, experience, and expertise, HCPs are uniquely positioned to provide detailed follow-up, present pointed inquiry, and give informed opinions about care in the ED. We present 1 year's data from a system initiated to capture HCP complaints to the ED, respond systematically, and integrate these into our quality management program.

Methods: Complaints to our metropolitan, academic ED from HCPs during 1 calendar year were reviewed. Receipt of an HCP complaint to the ED generated a "care concern" alert, forwarded to the involved emergency physician, who responded within 7 days. All complaints were routed through 2 quality managers who reviewed them, assigned 1 of 8 categories to the primary complaint, and evaluated the need for formal peer review. Descriptive data are presented.

Results: Of 185 complaints to the ED, 53 (29%) were from HCPs, representing 1 per 1,000 visits, or 3.3 for 1,000 admissions. Of these, 31 (58%) related to medical care in the ED: 8 (15%) to diagnostic workup, 9 (16%) to ED management, and 14 (26%) to consultations; 11 (21%) related to miscommunication; 7 (13%) related to disposition: 4 (8%) to admitting service, 2 (4%) inappropriate discharge, and 1 (2%) to inappropriate transfer; and 4 (8%) related to infraction of a hospital policy. Overall, 10 (19%) cases, on formal review, led to staff reeducation or clarification of policy, and 2 cases resulted in new ED operational policy.

Conclusion: HCP complaints highlight an aspect of customer care in the ED that is sometimes overlooked: that which we provide to other services within the hospital. Compared to patient complaints, those from HCPs primarily relate to patient care issues, many of which raise significant concerns requiring intervention. This underused source of patient care information presents a wealth of opportunity for quality improvement and customer service in the ED.

58 Hourly Emergency Department Census: A Simple Measure of Crowding

Waxman DA, Husk G, Akhtar S, Krishnamurthy C/Beth Israel Medical Center, New York, NY

Study objectives: Although emergency department (ED) crowding is widely believed to be a pervasive problem, the lack of a commonly accepted measure of crowding hinders research on the subject. We propose hourly ED census (census) as a measure of crowding. We measure ED crowding by calculating the census using the patient's ED arrival and departure times and demonstrate that census correlates with ambulance diversion and with patients leaving without being seen (LWBS), 2 adverse outcomes of crowding.

Methods: This was a retrospective study of all patients treated in the main ED of an urban teaching hospital in 2002. We developed a computer program to calculate the census for each hour in 2002 using 2 variables from administrative databases—each patient's time of ED arrival and departure. Using logistic regression, we calculated the probability of a patient LWBS as a function of the census when the patient registered. We also used logistic regression to calculate the probability of ambulance diversion as a function of census.

Results: Median census varied more than twofold over the course of the day, and the 90th percentile census at a given hour was approximately twice the 10th percentile census. LWBS rates were associated with census. The logit odds ratio was 1.05 (95% confidence interval [CI] 1.04 to 1.06). The LWBS rate ranged from zero at a census of 1% to 7.8% (95% CI 6.5% to 9.2%) at a census of 42 patients (175% of available treatment spaces). Diversion rates were near zero at a census of up to 30 patients (125% of available treatment spaces) and were higher above that. Ambulance diversion was strongly related to census, with an odds ratio of 1.10 (95% CI 1.07 to 1.12).

Conclusion: ED crowding varies widely from day to day and from hour to hour. It can be measured by hourly ED census, which can be calculated using administrative data. The hourly census is a predictor of the LWBS rate and of ambulance diversion. Hourly census provides an objective, quantitative measure of crowding that may facilitate further research on the topic.

59 The Effect of Performance Incentives on Resident Documentation in an Emergency Medicine Residency Program

Pines JM, Reiser RC, Braithwaite SA, Brady WJ, Ghaemmaghami CA, Cardella K, Rochman A, Martin ML/University of Virginia Health Science Center, Charlottesville, VA

Study objectives: We sought to improve resident medical record documentation in an academic emergency department by using an educational stipend as an incentive.

Methods: A stipend for educational expenses and materials was paid to residents for documenting medical records above a specific threshold level according to evaluation and management codes (99281 to 99285) during a 4-month period (December 2002 to March 2003). Comparisons were made with historic documentation levels, and residual effects of the program were measured. Fisher's exact test and t tests were used for statistical analysis.

Results: Twenty-two residents worked in the department over a 4-month period (42 resident-months). A total of 74% of residents received the educational stipend.